REMARKS

Claims 1-14 are pending in this application.

In the present Amendment, claims 5 and 14 have been amended as suggested by the Examiner to overcome informalities noted by the Examiner.

In addition, the independent claims, that is, claims 1, 5, 7, 11 and 14, have been amended to further clarify the claim language.

No new matter has been added and entry of the amendments is respectfully requested.

In Paragraph No. 1 of the Action, claims 5 and 14 are objected to because of the informalities listed in the Action. Appropriate correction is required.

As noted above, Applicants have amended claims 5 and 14 in the manner suggested by the Examiner, to obviate the informalities. Accordingly, the Examiner is respectfully requested to withdraw the objections to claims 5 and 14.

In Paragraph No. 4 of the Action, claims 1-3 and 5-9 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Sieber et al. (US 5,391,884) in view of Tecotzky et al. (US 5,138,171).

In Paragraph No. 5 of the Action, claims 4 and 10 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Sieber et al. in view of Tecotzky et al. as applied to claims 1 and 7 above, and further in view of Kastner et al. (US 3,412,248).

In Paragraph No. 6 of the Action, claims 11-14 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Sieber et al. in view of Dewaele (US 5,832,055) and Arakawa (US 5,051,589).

Applicants submit that these rejections should be withdrawn because Sieber et al. and the secondary references do not disclose or render obvious the method for measuring a radiation dose and the method of producing a radiation image of the present invention.

Upon reviewing the rejections, Applicants respectfully note that it appears the Examiner erroneously understands the basic concept of the invention of Sieber et al. and the basic concept of Applicants' invention. The differences between the basic concept of the invention of Sieber et al. and the basic concept of the present invention are described in more detail below.

The invention of Sieber et al. resides in a radiation image storing and reproducing method using a storage screen comprising a specific phosphor which comprises the steps of:

> imagewise exposing the storage screen to radiation of a first wavelength (such as X-rays) thereby storing an image pattern in the storage screen;
>
> exposing the image-storaged storage screen to a second wavelength (i.e., stimulating light), thereby stimulating the phosphor to emit radiation of a third wavelength (i.e., stimulated emission); and
>
> collecting the stimulated emission to produce an image representative of the image pattern initially stored on the storage screen. See col. 2, lines 10-52 of Sieber et al.

The invention of present claim 1 resides in a method for measuring a radiation dose which comprises the steps of:

> applying a target radiation to a dosimeter containing the specific phosphor to cause the phosphor to emit a green light; and
>
> measuring a variation per unit time of strength of the green light.

The invention of present claim 5 resides in a method of producing a radiation image which comprises the steps of:

applying a radiation having passed through a target or having been radiated by a target onto a radiation image storage panel (essentially the same as a storage screen) to cause the phosphor to emit a green light;

determining a variation per unit time of strength of the green light in each pixel which is imaginarily set on the storage panel, to obtain two-dimensional image data; and

producing a radiation image from the obtained image data.

The invention of present claim 7 resides in a method for measuring a dose of ultraviolet rays which comprises the steps of:

applying target ultraviolet rays to a means containing the specific phosphor to cause the phosphor to emit a green light; and

measuring a variation per unit time of strength of the green light.

The invention of present claim 11 resides in a method for measuring a radiation dose which comprises the steps of:

applying ultraviolet rays to a dosimeter containing a specific phosphor to cause the phosphor to emit a green light and a red light;

measuring the strength of the green light and the strength of the red light;

applying a target radiation to the dosimeter, so as to cause variation of atomic valency for the terbium and samarium;

applying ultraviolet rays to the dosimeter to which the target radiation has been applied, to cause the phosphor to emit a green light and a red light;

measuring the strength of the latter green light and the strength of the latter red light;

and

comparing the former strengths of the green light and red light with the latter strengths of the green light and red light.

The invention of present claim 14 resides in a method of producing a radiation image which comprises the steps of:

> applying ultraviolet rays to a radiation image storage panel containing a layer of a specific phosphor to cause the phosphor to emit a green light and a red light;
>
> measuring in each pixel which is imaginarily set on the storage panel, the strength of the green light and the strength of the red light, to obtain two-dimensional image data for each pixel;
>
> applying a radiation having passed through a target or having been radiated by a target onto a radiation image storage panel, so as to cause variation of atomic valency for the terbium and samarium in each pixel;
>
> applying ultraviolet rays to the storage panel to which the target radiation has been applied, to cause the phosphor to emit a green light and a red light;
>
> determining in each pixel the strength of the latter green light and the strength of the latter red light to obtain two-dimensional image data; and
>
> processing the latter strengths of the green light and red light with reference to the former strengths of the green light and red light in each pixel, for producing a radiation image from the obtained image data.

Apparently, Sieber et al. utilizes the light of the third wavelength (i.e., stimulated emission, which is not produced by the first X-ray irradiation but produced only when a stimulating light is afterward applied) for reproducing the radiation image initially formed on the storage screen, while the present invention utilizes a light or lights which are produced spontaneously upon irradiation of the radiation or ultra-violet rays. This difference is very important to understand the differences between the invention of Sieber et al. and the present invention. The concept of the invention of Sieber et al. cannot and does not teach Applicants' invention. Accordingly, any alleged combinations of the secondary references with Sieber et al. cannot teach Applicants' claimed invention, because the secondary references do not make up for this deficiency in Sieber et al.

In order to deferentiate the present invention more clearly from the teachings of Sieber et al., Applicants have amended each independent claim in the manner seen above. The Examiner will kindly note that these amended claims are essentially the same as those described above.

In view of the above, Applicants submit that the §103 rejections based on Sieber et al. and the secondary references should be reconsidered and withdrawn.

Allowance is respectfully requested.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (ONCE AMENDED) A method for measuring a radiation dose which comprises the steps of:

applying a target radiation to a dosimeter containing a terbium-samarium co-activated alkaline earth metal rare earth oxide phosphor which is composed of an oxygen atom and a composition of the formula (I):

$$M^{II}M^{III}_2{:}xTb, ySm \qquad (I)$$

in which M^{II} is at least one alkaline earth metal element selected from the group consisting of Mg, Ca, Sr and Ba; M^{III} is at least one rare earth element selected from the group consisting of Y, La, Gd and Lu; and x and y are numbers satisfying the conditions of $0<x\leq0.1$ and $0<y\leq0.1$, respectively<u>, to cause the phosphor to emit a green light</u>;

and

measuring a variation per unit time of strength of [a] <u>the</u> green light [emitted by the phosphor].

5. (ONCE AMENDED) A method of producing a radiation image which comprises the steps of:

applying a radiation having passed through a target or having been radiated by a target onto a radiation image storage panel containing a layer of terbium-samarium co-activated alkaline earth metal rare earth oxide phosphor which is composed of an oxygen atom and a composition of the formula (I):

$$M^{II}M^{III}_2{:}xTb, ySm \qquad (I)$$

in which M^{II} is at least one alkaline earth metal element selected from the group consisting of Mg, Ca, Sr and Ba; M^{III} is at least one rare earth element selected from the group consisting of Y, La, Gd and Lu; and x and y are numbers satisfying the conditions of $0<x\leq0.1$ and $0<y\leq0.1$, respectively, to cause the phosphor to emit a green light;

determining a variation per unit time of strength of [a] the green light [emitted by the phosphor] in each pixel which is imaginarily set on the storage panel, to obtain two-dimensional image data [for each pixel];

and

producing a radiation image from the obtained image data.

7. (ONCE AMENDED) A method for measuring a dose of ultraviolet rays which comprises the steps of:

applying a target [radiation] ultraviolet rays to a means containing a terbium-samarium co-activated alkaline earth metal rare earth oxide phosphor which is composed of an oxygen atom and a composition of the formula (I):

$$M^{II}M^{III}_{2}\text{:xTb, ySm} \qquad \text{(I)}$$

in which M^{II} is at least one alkaline earth metal element selected from the group consisting of Mg, Ca, Sr and Ba; M^{III} is at least one rare earth element selected from the group consisting of Y, La, Gd and Lu; and x and y are numbers satisfying the conditions of $0<x\leq0.1$ and $0<y\leq0.1$, respectively, to cause the phosphor to emit a green light;

and

measuring a variation per unit time of strength of [a] the green light [emitted by the phosphor].

11. (ONCE AMENDED) A method for measuring a radiation dose which comprises the steps of:

applying ultraviolet rays to a dosimeter containing a terbium-samarium co-activated

alkaline earth metal rare earth oxide phosphor which is composed of an oxygen atom and a composition of the formula (I):

$$M^{II}M^{III}_2{:}xTb,\ ySm \qquad (I)$$

in which M^{II} is at least one alkaline earth metal element selected from the group consisting of Mg, Ca, Sr and Ba; M^{III} is at least one rare earth element selected from the group consisting of Y, La, Gd and Lu; and x and y are numbers satisfying the conditions of $0<x\leq 0.1$ and $0<y\leq 0.1$, respectively, to cause the phosphor to emit a green light and a red light;

measuring a strength of [a] the green light and a strength of [a] the red light [emitted by the phosphor to which the ultraviolet rays have been applied];

applying a target radiation to the dosimeter, so as to cause variation of atomic valency for the terbium and samarium;

applying ultraviolet rays to the dosimeter to which the target radiation has been applied, to cause the phosphor to emit a green light and a red light;

measuring a strength of the latter green light and a strength of [a] the latter red light [emitted by the phosphor to which the ultraviolet rays have been applied after application of the target radiation];

and

comparing the former strengths of the green light and red light with the latter strengths of the green light and red light.

14. (ONCE AMENDED) A method of producing a radiation image which comprises the steps of:

applying ultraviolet rays to a radiation image storage panel containing a layer of a terbium-samarium co-activated alkaline earth metal rare earth oxide phosphor which is composed of an oxygen atom and a composition of the formula (I):

$$M^{II}M^{III}_2{:}xTb,\ ySm \qquad (I)$$

in which M^{II} is at least one alkaline earth metal element selected from the group consisting of Mg, Ca, Sr and Ba; M^{III} is at least one rare earth element selected from the group consisting of Y, La, Gd and Lu; and x and y are numbers satisfying the conditions of $0<x\leq0.1$ and $0<y\leq0.1$, respectively, to cause the phosphor to emit a green light and a red light;

measuring in each pixel which is imaginarily set on the storage panel, a strength of [a] the green light and a strength of [a] the red light [emitted by the phosphor to which the ultraviolet rays have been applied], to obtain two-dimensional image data [for each pixel];

applying a radiation having passed through a target or having been radiated by a target onto [a] said radiation image storage panel, so as to cause variation of atomic valency for the terbium and samarium in each pixel;

applying ultraviolet rays to the storage panel to which the target radiation has been applied, to cause the phosphor to emit a green light and a red light;

determining in each pixel a strength of the latter green tight and a strength of [a] the latter red light [emitted by the phosphor to which the ultraviolet rays have been applied after application of the target radiation], to obtain two-dimensional image data [for each pixel]; and

processing the latter strengths of the green light and red light with reference to the former strengths of the green light and red light in each pixel, for producing a radiation image from the obtained image data.